

Eurema (Hypanartia) bella, Fabr.

4. 11. 25. = 1074. Minas Geraës. (As 559.)

Bz. 9. 3. 26. = 1075. Rio de Janeiro.

This specimen bears Westwood's number N. 4; his list adds another, captured 26. 11. 26 at Santos.

These two species, originally placed under one number (N. 4) in a clerk's handwriting, were differentiated by Westwood, who placed the examples of *lethe* under a new number (N. 4*).

[To be continued.]

IV.—Notes on the Genus *Acerodon*, with a Synopsis of its Species and Subspecies, and Descriptions of Four new Forms. By KNUD ANDERSEN.

The Genus ACERODON.

Type.—*Pteropus jubatus*, Eschscholtz.

Species.—Six (nine recognizable forms), viz. *A. mackloti* (three subspecies), *gilvus*, *celebensis*, *humilis*, *lucifer*, *jubatus* (two subspecies).

Range.—Timor group (Timor, Flores, Alor, Sumba); Celebes group (Celebes, Selayar); Talaut Islands; Philippines*.

Differential characters.—*Acerodon* differs from *Pteropus* by the combination of the following dental characters: (1) Posterior basal ledge of p_4 , m_1 , and m_2 extending along inner base of teeth as a broad, sharply defined shelf; this character is sufficient to distinguish *Acerodon* from any species of *Pteropus*, except *Pt. anetianus*, which possesses a perfectly similar inner basal ledge in the same teeth, but in every other respect is closely allied to the genuinely Pteropine *Pt. samoënsis*: (2) a well-developed antero-internal basal cusp in p^4 and m^1 (a similar, but smaller, antero-internal cusp developed in

* The range of the "subgenus" *Acerodon* is stated by Matschie to be the Philippines, Gilolo, Batjan, Celebes, Flores, and Timor (Megachir. p. 99, 1899), and essentially the same distribution is given by Miller (Fam. & Gen. Bats, p. 59, 1907). Gilolo and Batjan must be excluded from the known range of the genus. The records of *Acerodon* from the Gilolo group are based on mistaken identifications of Gray's *Pteropus caniceps* and his *Pteropus mackloti* var. *batchiana*; the latter name is a synonym of the former, and *Pteropus caniceps* a perfectly typical *Pteropus*.

p^3 of most species and in p_3 of *A. humilis*, *jubatus*, and *lucifer*); a corresponding cusp indicated in certain species of *Pteropus*, but never as well developed and sharply differentiated as in *Acerodon*: (3) molariform teeth above and below (p^4 , m^1 , p_4 , m_1 , m_2) rather shorter and broader, and main cusps with more trenchant edges: (4) m^2 rather less reduced: (5) upper incisors slenderer and more acutely pointed*.—Skull and external characters not differing from those of *Pteropus*.

Original description of genus.—Palmer † gives as primary reference for the genus *Acerodon*, Jourdan, the "Ann. Sci. Nat., Paris, 2° sér., viii, Zool. 369–370, Dec. 1837," and as secondary reference the "Comptes Rendus, Paris, vi, 3, 1838." To this it must be remarked, first, that these two papers give, the one exclusively, the other chiefly, F. Cuvier's "Rapport" and critical remarks on a memoir by Jourdan, and that therefore, really as well as formally, not Jourdan but F. Cuvier is the author of the two papers referred to by Palmer; second, that in both of these papers the name of the present genus occurs only in its French form (*Acérodon*), and therefore cannot, technically, date from these papers; third, that *prima facie* it appears unlikely that F. Cuvier's "Rapport," which was read before the Paris Academy, should have been published earlier in the 'Annales des Sciences Naturelles' than in the 'Comptes Rendus' of the meetings of the Academy. In these circumstances I have

* Some of the differential characters of *Acerodon* given by Miller in his highly useful 'Revision of the Families and Genera of Bats' (p. 59, 1907) prove, on examination of a larger material of *Pteropus* and *Acerodon* than that studied by Miller, to be untenable. "Lower incisors [Miller writes] differing from those of *Pteropus* in the much greater contrast in size between the inner and outer tooth of each pair." In *Acerodon* i_2 is in cross-section of the crown from twice to three times the bulk of i_1 ; practically the same is the case in a majority of species of *Pteropus*, while in others (e. g. *Pt. lombocensis*, *solitarius*, *samoënsis*, *anetianus*, *pselaphon*, *pilosus*, *tuberculatus*) the disproportion in the size of these teeth is greater than in any *Acerodon*, i_2 being sometimes four, five, or six times the bulk of i_1 . "Canines much shortened as compared with *Pteropus*, the mandibular canine little exceeding the height of pm_3 ." There is in *Pteropus* every intergradation from short, stout, and distinctly recurved, to very long, slender, and nearly straight canines. "Though reduced in length the canines retain their thickness, and the cingulum is even better developed than in the related genus." The numerous species of *Pteropus* show any intermediate stage from a very narrow to an excessively broad cingulum of the canines (the latter extreme exhibited by *Pt. samoënsis*, *anetianus*, *pselaphon*, *pilosus*, *tuberculatus*, *insularis*, *phaeocephalus*); the cingulum of the canines is in these species of *Pteropus* much broader than in any *Acerodon*.

† Index Gen. Mamm. p. 73 (1904).

had to trace the history of Jourdan's paper and F. Cuvier's report, which appears to be as follows:—

(1) "9 Oct. 1837"—C. R. Ac. Sci. Paris, v. pp. 521–524. This is Jourdan's original paper. It contains descriptions of two new genera of mammals (*Heteropus* and *Nelomys*) and five new species (*Heteropus alboqularis*, *Nelomys brasiliensis*, *Halmaturus irma*, *Hydromys fulvoqaster*, and *Paradoxurus philippinensis*). No reference to *Acerodon*. The paper was read before the Academy on 9 Oct. 1837, and presumably published very soon after.

(2) "14 Oct. 1837"—L'Echo du Monde Savant et L'Hermès *, iv. no. 275, p. 156. Jourdan describes "three" new genera, *Nelomys* (see above), *Acerodon*, and *Heteropus* (see above). This is apparently the earliest description of the genus *Acerodon* † (not known to Palmer). The issue of the weekly periodical 'L'Echo' in which it appeared is dated "Samedi, 14 octobre 1837," and was very likely published on that day.

(3) "Nov. 1837"—L'Institut, v. no. 221, p. 351. Reprint of no. (1), *suprà*.

(4) "2 Jan. 1838"—C. R. Ac. Sci. Paris, vi. pp. 2–6. F. Cuvier's "Rapport sur un mémoire de M. Jourdan, de Lyon, concernant quelques mammifères nouveaux." This is Palmer's secondary reference. Author, F. Cuvier, not Jourdan; no quotations of Jourdan's own words; *Acerodon*

* I have to thank Mr. B. B. Woodward and Mr. C. Davies Sherborn for having directed my attention to this periodical. It is not in the library of the Natural History Museum. I have seen a copy in the Bloomsbury Museum.

† The chief character of *Acerodon* is pointed out by Jourdan in the following words: it "diffère de toutes les autres Roussettes, parce que ses molaires sont larges transversalement, presque carrées, et que celles de la mâchoire inférieure ont trois collines," and as type is fixed by the author himself "la Roussette . . . qui habite l'île Luçon, ainsi que les petites îles voisines." From this there is no doubt whatever that the type of *Acerodon* is *A. jubatus*. But Jourdan makes also, in this connexion, some remarks on the "Roussette . . . rapportée de Vanicoro par MM. Quoy et Gaimard" [i. e. "*Pteropus vanikorensis*"], the dentition of which shows, in Jourdan's opinion, some leanings towards that of *Acerodon*. Here is the explanation of the fact that Lesson, the only author, between 1837 and 1896, who recognizes *Acerodon* as a distinct genus, includes in the genus two species, *A. vanikorensis* and *A. jubatus* (N. Tabl. R. Anim., Mamm. p. 14, 1842). *Pt. vanikorensis*, in its original sense, is a mixture of two widely different species, the true *Pt. vanikorensis* (the skins described by Quoy et Gaimard), a species closely allied to *Pt. tonganus*, and *Pt. tuberculatus* (the skull described by the same authors, and erroneously believed by them to belong to the same species as the skins), which is allied to *Pt. pselaphon*. *Pt. vanikorensis* and *tuberculatus* are typical members of the genus *Pteropus*.

occurs only in the French form, "Acérodon." The meeting was held on 2 Jan. 1838, the "Comptes Rendus" presumably published a few days later*.—It appears rather strange that Cuvier's Report on Jourdan's paper contains remarks on Acérodon, whereas Jourdan's original paper, as printed in the "Comptes Rendus" (see no. (1), *suprà*), has no reference to this genus. The explanation may be this: Cuvier's remarks on Acérodon are not very favourable for its validity as a distinct genus; as Cuvier, together with Duméril, was the Academy's "Commissaire" for zoological papers, he may (privately) have informed Jourdan of this opinion, and Jourdan therefore have withdrawn the description of *Acerodon* from the paper laid before the Academy, but almost simultaneously published it in the "Echo" (no. (2), *suprà*). But this is, of course, only conjecture.

(5) After 5 Feb. 1838—Ann. Sci. Nat. (2) viii. Zool. pp. 367–374. A reprint of no. (4), *suprà*, but with the addition, in footnotes, of quotations from Jourdan's original paper, these quotations, taken together, amounting to a complete reprint of no. (1). This is Palmer's primary reference, evidently because this number of the 'Annales' is dated December 1837; but since it contains a paper read before the Paris Academy on Feb. 5, 1838, it must have been published after this date.

Principal subdivisions of genus.—The six species of *Acerodon* recognized in this paper fall into two natural sections, the one confined to the Timor and Celebes groups, the other to the Talaut and Philippine Islands. The three species of the former section are more primitive, in so far as p_3 is typical Pteropine, without antero-internal basal cusp; the ears are relatively longer and the colour of the fur pale above and beneath. The two species inhabiting the Timor group, viz. *A. mackloti* (Timor, Flores, Alor) and *A. gilvus* (Sumba), are closely related, differing chiefly in size, whereas the Celebean species (*A. celebensis*) is characterized by its much weaker dentition. The three species of the latter group are more specialized in having a distinct antero-internal basal cusp in p_3 ; the ears are relatively shorter, the colour of the fur much darker; in general aspect the coloration of these

* This statement, that the "Comptes Rendus" of the meeting of the Paris Academy held on Jan. 2, 1838, were probably published a few days after that date, might seem to be contradicted by the fact that this number of the C. R. contains (p. 22) a table of meteorological observations for every day of "janvier 1838." But "janvier 1838" is obviously a misprint for "décembre 1837"; compare p. 184 of the same volume, in which page the true table for Jan. 1838 appears.

species is much nearer to that of an ordinary *Pteropus*: head, back, and underparts dark, mantle paler. The single species of this group inhabiting the Talaut Islands (*A. humilis*) is easily recognizable by its small size; externally it is much like certain dark-coloured forms of *Pteropus hypomelanus*; the two Philippine species (*A. jubatus* and *lucifer*) are chiefly characterized by their larger size and strikingly pale-coloured nuchal patch; *inter se*, they differ only in size.

Synopsis of Species and Subspecies.

- I. No antero-internal basal cusp in p_3 ; ears longer than muzzle (front of eye to tip of nose); pale-coloured forms: back and underparts approximately mars-brown or vandyck-brown, lightened with golden buffy, head and mantle essentially buffy. (Timor and Celebes groups.)
- a. Dentition heavy: m^1 , length (antero-posterior diameter of crown) 5.6-6 mm.; skull, total length 66-72 mm. (Timor group.)
- a^1 . Larger: skull, total length 69-72 mm.; forearm 139-156 mm. (Timor; Flores; Alor.) 1. *A. mackloti*.
- a^2 . Forearm about 139-146 mm.
- a^3 . Underside of body rather thinly sprinkled with buffy hairs. (Timor.) 1 a. *A. m. mackloti*.
- b^3 . Underside of body thickly sprinkled with buffy hairs. (Flores.) 1 b. *A. m. floresii*.
- b^2 . Forearm about 156 mm. (Alor.) 1 c. *A. m. alorensis*.
- b^1 . Smaller: skull, total length 66 mm.; forearm 135 mm. (Sumba.) 2. *A. gilvus*.
- b. Dentition much weaker: m^1 , length 4.7-5 mm.; skull, total length 62.5-63 mm. (Celebes group.) 3. *A. celebensis*.
- II. A distinct antero-internal basal cusp in p_3 ; ears shorter than muzzle; dark-coloured forms: back and underparts seal-brown or burnt umber, more or less sprinkled with pale hairs; mantle chestnut or dark cinnamon-rufous. (Talaut Is.; Philippines.)
- c. Small: forearm about 140 mm.; no buffy nuchal patch. (Talaut Is.) 4. *A. humilis*.
- d. Large: forearm 165-205 mm.; a buffy nuchal patch strongly contrasting with dark mantle and sides of neck. (Philippines.)
- c^1 . Forearm about 165 mm. (Panay.) 5. *A. lucifer*.
- d^1 . Forearm 182-205 mm. (Philippines generally.) 6. *A. jubatus*.
- c^2 . Averaging smaller: forearm 182-198 mm. (Philippines north of Mindanao.) 6 a. *A. j. jubatus*.
- d^2 . Averaging larger: forearm about 205 mm. (Mindanao.) 6 b. *A. j. mindanensis*.

Acerodon mackloti alorensis, subsp. n.

Skull and teeth as in *A. m. mackloti* and *floresii* (skull of type, total length 71.8 mm.; maxillary tooth-row, $c-m^2$ 29.7; m^1 , length 5.8, breadth 4.5), but external dimensions larger: forearm 156 mm., against 139–146 in nine adult specimens of the allied forms. Colour of fur scarcely differing from that of *A. m. floresii*.

Type. ♂ ad. (alc., skull), Alor (Ombay), Lesser Sunda Islands, April 16, 1896; collected by A. Everett; B.M. 98. 3. 11. 1.

Acerodon gilvus, sp. n.

Skull similar to that of *A. mackloti*, but considerably smaller: total length (type) 66 mm., against 69–72. Upper premolars and molars scarcely differing from those of *A. mackloti*, but lower incisors, p_1 , p_3 , p_4 , and m_1 , distinctly smaller. Forearm (type) 135 mm., against 139–156 in *A. mackloti*. General style of colour as in *A. mackloti*, but back conspicuously paler, light cream-buffy, with the Prout's-brown or vandyck-brown bases of the hairs perfectly concealed on back, slightly showing through on rump.

Type. ♂ ad. (skin, skull), Waingapo, Sumba, Lesser Sunda Islands, Sept. 1896; collected by A. Everett; B.M. 98. 11. 3. 19.

Acerodon humilis, sp. n.

Allied to *A. jubatus*, with which it accords in the characters of the teeth (a distinct antero-internal basal cusp in p_3), the size of the ears (shorter than muzzle), and general colour of the fur of the body and mantle, but much smaller, and without buffy nuchal patch. Forearm about 140 mm. *Hab.* Talaut Islands.

Back and rump nearly seal-brown, sprinkled all over with broccoli-brown hairs, producing the general effect of a very dark shade of hair-brown. Breast, belly, and flanks essentially like back, but pale hairs more buffy hair-brown. Mantle, sides of neck, and foreneck dark russet, slightly paler on foreneck than on nape, forming a complete collar round neck and narrowly encircling base of ears; base of hairs nearly seal-brown. Occiput, crown, interocular space, and sides of muzzle essentially similar to back; temporal region, chin, and throat blackish seal-brown, mixed with a few silvery-whitish and buffy hairs.

Type. ♀ ad. (skin, skull), Lirong, Talaut Islands, March

1897; collected by John Waterstradt; presented by the Hon. W. Rothschild; B.M. 8. 7. 26. 6.

Acerodon jubatus, Eschsch.

Specimens examined.—Nineteen from the collections of the Berlin, U.S. National, and British Museums, viz. :—Luzon, ten, including the two cotypes of *Pt. pyrrocephalus* (Berlin Museum, nos. 340, 341, ♂ ad., ♀ ad., mounted, skulls separate, that of 340 (marked 7202) being the original of Meyen's skull figures, *l. s. c.*); "Philippines" (probably Luzon), two; Leyte, three, topotypes of *Pt. auri-nuchalis*; Negros, two; Dinagat, one; Mindanao, one.

Remarks.—An examination of the above material has satisfied me that the Philippine Islands are inhabited by two races of *A. jubatus*, the one distributed over all the islands from Luzon southward to Dinagat (specimens examined from Luzon, Leyte, Negros, Dinagat), the other confined to Mindanao. The Mindanao race differs from typical *jubatus* only by its larger average size. There is no tangible difference in the colour of the fur of the two races. Such variations in colour as do occur (more blackish or more dark brownish tinge of back, greater or lesser amount of pale sprinkling of underparts, blackish or chocolate tinge of foreneck, more cream-buffy or yellowish-buffy or ochraceous-buffy colour of nuchal patch) are perfectly individual, independent of sex, age, and locality; practically all colour-variations are represented in the series of ten specimens from Luzon.

The subjoined tables (pp. 27–29) give a summary of the measurements of the series of specimens.

According to the above, the two races of *A. jubatus* would have to stand as follows:—

Acerodon jubatus jubatus, Eschsch.

1831. *Pteropus jubatus*, Eschscholtz, Zool. Atl. pt. iv. p. 1, pl. xvi. (animal, incisors, and canines) (Manila).

1833. *Pteropus pyrrocephalus*, Meyen, N. Act. Acad. Cæs. Leop.-Car. xvi. pt. 2, p. 604, pl. xlv. (animal), pl. xlvi. figs. 1, 2, 3 (skull, teeth) (Manila).

1896. *Pteropus auri-nuchalis*, Elliot, Field Col. Mus. Publ., Zool. i. p. 77, pl. xii. (skull) (Leyte).

Forearm about 182–198 mm., lower leg 86–94. *Hab.* Philippines, north of Mindanao.

Acerodon jubatus mindanensis, subsp. n.

Averaging larger: forearm about 205 mm., lower leg 96. *Hab.* Mindanao.

Type. ♂ ad. (skin, skull), Mindanao; collected by Dr. J. B. Steere; B.M. 76. 10. 4. 1.

External measurements of Acerodon jubatus.

	<i>A. j. jubatus.</i>				<i>A. j. mindanensis.</i>				
	Luzon. 7 ad.		Icyle. 3 ad.			Negros. 2 ad.		Dinagat.		Type.
	Min.	Max.	Min.	Max.	♂ ad. mm.	♀ ad. mm.	♂ ad. mm.	♀ ad. mm.	
Forearm.....	182	191	190	198	182.5	187	184	184	♂ ad. mm. 205
1st digit, total length, c. u.	77	82	80	86.5	80	80	82	82	.....
" metacarpal.....	16.5	18.5	17.5	19	16.5	18	17	17	.....
" 1st phalanx.....	39	42.5	40	45	40	41	42	42	.....
2nd digit, metacarpal.....	89.5	92.5	94	99	85	89.5	86	86	93.5
" 1st phalanx.....	18	23.5	23	24	22	25	22	22	20
" 2nd-3rd phalanx, c. u.	19	22	20	24	21.5	24	22.5	22.5	25
3rd digit, metacarpal.....	120	127	128	132.5	123.5	126	122	122	132
" 1st phalanx.....	92	99.5	98	99	92.5	96.5	92	92	100.5
" 2nd phalanx.....	130	139.5	130	143.5	141	137.5	128	128	.....
4th digit, metacarpal.....	117.5	124	126	130	120.5	125	117.5	117.5	.....
" 1st phalanx.....	74.5	82	80	82	76.5	77.5	79	79	81.5
" 2nd phalanx.....	72	82	72	79	80.5	74	72	72	81
5th digit, metacarpal.....	124	128.5	130.5	136	123.5	129.5	122	122	136
" 1st phalanx.....	54	59.5	57	58.5	55	59.5	54	54	56
" 2nd phalanx.....	51.5	59	50	55	57	56	53	53	60.5
Ears, length from notch.....	30.5*	32.5*	30.5†	.....	33	30.5	32.5	32.5	.....
" greatest breadth, flattened ..	20.5*	21.5*	20†	.....	20.5	20	19	19	.....
Lower leg.....	86	90	89	94	86	.....	60	60	96
Foot, c. u.	56	59	.....	.....	.....	.....	23	23	62
Calcaneal.....	21.5	26	.....	.....	.....	.....	.....	.....	.....
Interfemoral, depth in centre.....	8*	8.5*	.....	.....	.....	.....	8	8	.....

* Measurements from two specimens.

† Measurements from one specimen.

Measurements of skulls and tooth-rows of *Acerodon jubatus*.

	<i>A. j. jubatus</i> .						<i>A. j. mindanensis</i> .	
	Luzon. 7 ad.		Leyte. 3 ad.		Negros. 2 ad.			Dinagat.
	Min. mm.	Max. mm.	Min. mm.	Max. mm.	♂ ad. mm.	♀ ad. mm.		
Total length, to gnathion	77.2	84	83*	81*	77.2	80.5	♂ ad. mm. 85	
Palation to incisive foramina	39.2	43	42.5	43	40	41	.....
Front of orbit to tip of nasals	25.8	27.5	26.8	29	25	25.5	29	
Breadth of brain-case at zygomata ..	27	29.5	28.5	29.5	26.7	27.2	29.5	
Zygomatic breadth	41.3	46	44.5	47	41.7	42	46.8	
Breadth across m^1 , externally	23.5	26	25	27	24.2	25	26.5	
Lachrymal breadth	16.7	18.2	18	19	16.8	18.2	.....
Breadth across canines, externally ..	15	17	15.3*	17.2*	15.8	.....	18
Postorbital breadth	8	9.2	8.7	10.2	8.5	9.5	11	
Interorbital breadth	10.5	13.2	12.5	13	12	12.5	14	
Breadth of mesopterygoid fossa	9.8	11	10	11	9	10.8	.....
Between p^3-p^4	11.7	13.3	13*	13.2*	12.2	12.8	13.7	
Between cingula of canines	7.8	9	7.7*	8.7*	8	.....	9.2
Orbital diameter	14.8	16	16	16	14.8	16	16	
Mandible, length	62	67.5	66.5	68	62	65.2	69.5	
Upper teeth, $c-m^2$	32	36	35*	35*	33	32.2	34	
Lower teeth, $c-m_3$	34.2	40	36.8	37.8	36.5	35.7	37.8	
Upper incisors, combined breadth	7	8.5	7.2*	7.8*	7.5	7.5	8.8	

* Measurements of two skulls only.

Measurements of individual teeth of *Acerodon jubatus*.

	<i>A. j. jubatus</i> .				<i>A. j. mindanensis</i> .
	Luzon, 7 skulls.	Leyte, 3 skulls.	Negros, 2 skulls.	Dinagat.		Mindanao, Type.
	Min. Max.	Min. Max.	♂ ad. ♀ ad.	♀ ad.	♂ ad.
	mm. mm.	mm. mm.	mm. mm.	mm.	mm.
p^3 , length *	5.7 6.6	6.2† 6.2†	5.8 6	6	6.5
" breadth	4.7 5	4.7† 5.2†	4.7 4.8	5.2	4.8
p^1 , length	6.3 6.8	6.2 7.2	6.2 6.2	6.7	6.8
" breadth	5.1 5.8	5 5.9	5.2 5.3	6	5.8
m^1 , length	6.8 7.1	7.2 7.7	6.9 6.9	7.2	7
" breadth	5 5.3	5 5.5	5.1 5.2	5.6	5.2
m^2 , length	3.8 4.2	4 4.5	3.8 4	3.8	4.3
" breadth	3 3.7	2.8 3.2	3.1 3.5	3	3.7
p_1 , length	2.8 3.6	2.8 3.2	3 2.6	3	3
" breadth	2.5 3.1	2.8 2.8	2.8 2.5	2.8	2.8
p_2 , length	5.8 6.7	6.3 6.8	6 6	6.2	6.2
" breadth	3.7 3.9	3.8 4	3.8 3.8	4	3.8
p_4 , length	6.3 7	6.7 7.2	6.5 6.2	7	6.5
" breadth	4.5 5	4.8 5.2	4.5 4.8	5	4.8
m_1 , length	6.5 6.8	6.7 7.7	6.8 6.8	6.8	6.2
" breadth	4.9 5.7	5.5 5.8	5 5	5.7	5.4
m_2 , length	4.8 5.5	5.2 5.8	5 5	5.7	5.2
" breadth	4.2 5	4.8 5	4.1 4.3	4.8	5
m_3 , length	2.8 3.2	3 3.2	2.7 2.7	2.9	3
" breadth	2.2 2.8	2.7 2.8	2.5 2.7	2.5	2.8

* Antero-posterior extent of crown.

† Measurements from two skulls only.